SmartSwitch 9500
9A600 ATM Module
Hardware and Installation Guide

9032703

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Application of Council Directive(s):	**89/336/EEC** **73/23/EEC**
Manufacturer's Name:	**Cabletron Systems, Inc.**
Manufacturer's Address:	**35 Industrial Way** **PO Box 5005** **Rochester, NH 03867**
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European Representative Address:	**Cabletron Systems Limited** **Nexus House, Newbury Business Park** **London Road, Newbury** **Berkshire RG13 2PZ, England**
Conformance to Directive(s)/Product Standards:	**EC Directive 89/336/EEC** **EC Directive 73/23/EEC** **EN 55022** **EN 50082-1** **EN 60950**
Equipment Type/Environment:	**Networking Equipment, for use in a Commercial or Light Industrial Environment.**

We the undersigned, hereby declare, under our sole responsibility, that the equipment packaged with this notice conforms to the above directives.

Mr. Ronald Fotino	Mr. J. Solari
Full Name	Full Name
Principal Compliance Engineer	Managing Director - E.M.E.A.
Title	Title
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Chapter 1

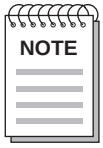
Introduction

Document Objectives

This document, the *SmartSwitch 9500 9A600ATM Module Hardware and Installation Guide,* contains introductory, installation and specification information for the support of the 9A600 SmartSwitch Module. Use this guide to learn about the following topics:

- Overview of the 9A600
- Installing the 9A600 in the SmartSwitch 9500 chassis
- Installing ATM Network Interface Modules (ANIMs)
- Learning the hardware specifications of the 9A600 and the available ANIMs

Prior to installing the 9A600, you should have a working knowledge of ATM networking principles.



In this document, the Cabletron Systems SmartSwitch 9000 chassis is referred to as the "SmartSwitch 9500 chassis" which indicates a SmartSwitch 9000 chassis with one or more 9A600 modules installed.

The 9A600 may also be installed in a SmartSwitch 9000 chassis, which indicates a chassis without a Cell Transfer Matrix (CTM) backplane.

Overview

The 9A600 (shown in Figure 1-1) is a 5.4 Gbps, single slot module for the SmartSwitch 9500 chassis. Up to four ATM Network Interface Modules (ANIMs) of any type can be plugged into the 9A600 to provide front panel connectivity to the network. Cabletron Systems ANIMs can support up to 622 Mbps of bandwidth per port. The 9A600 switches data between the ANIMs that are installed in the module.

Through its distributed switching architecture, the 9A600 allows all the modules in the chassis to appear as a single entity, with a single IP address and a single ATM address. The individual i960 processors are transparent to the network manager and management applications. A fully loaded SmartSwitch 9500 chassis appears as a single switch, with one IP address, and one ATM address.

The 9A600 is fully compatible with the following ATM Forum specifications:

- Integrated Local Management Interface (ILMI) 4.0 for autoconfiguration.
- UNI v3.0 /3.1 and v4.0 for signalling.
- ATM Forum P-NNI 1.0 and IISP 3.0/3.1 routing specifications for establishing connections between ATM switches.
- IETF AToM MIB (RFC 1695) and AToM II MIB.
- LANE 1.0 for the management LAN Emulation Client.

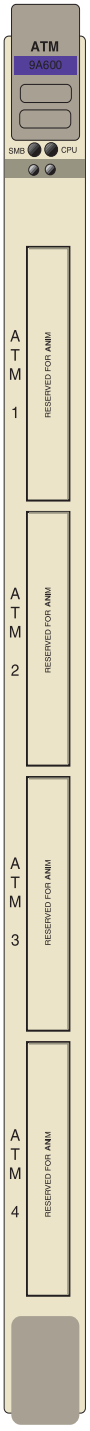


Figure 1-1. The 9A600

Features

The features of the 9A600 are described in the sections below:

Processor

The 9A600 is equipped with an advanced Intel i960 microprocessor. This microprocessor provides signalling, SNMP management, and serves as the in-band management LAN Emulation Client (LEC).

Cabletron Systems ASICs

The 9A600 contains four different Cabletron Systems designed ASICs that provide a variety of switching services. For more information on these ASICs refer to Chapter 3.

System Management

The 9A600 connects to the two System Management Buses (SMB-1 and SMB-10) for module management. Management features include the following:

- Power and environmental status monitoring
- PNNI and ILMI configuration
- SmartSwitch 9500 chassis IP address assignment
- Ability to configure the in-band management LAN Emulation Client
- SmartSwitch 9500 chassis SNMP community names and trap IP address assignment
- Ability to access Local Management screens of any module installed in the chassis

Connectivity

The 9A600 can be equipped with a variety of front panel interfaces called ATM Network Interface Modules (ANIMs). ANIMs provide a variety of physical layer cabling options, including the following:

- Unshielded Twisted Pair (UTP) using OC-3.
- Multimode Fiber Optic Cable (MMF) using OC-3 or OC-12.
- Single Mode Fiber Optic Cable (SMF) using OC-3 or OC-12.
- Coaxial Cable using DS-3.

ANIMs are also capable of handling varying amounts of bandwidth including SONET OC3/SDH, and STS-3/STM-1 (155 Mbps), SONET OC12/SDH (622 Mbps) and DS3 (45 Mbps).

Early Packet Discard (EPD) and Partial Packet Discard (PPD)

The 9A600 supports early and partial packet discard to help ensure that quality of service parameters are met for all connections. EPD and PPD, in conjunction with traffic policing, discard ATM cells that the end device would have to retransmit (due to buffer overload, line loss, line bit errors, faulty cells etc.) thereby limiting the amount of bad traffic present on the ATM network.

LANVIEW LEDs

The 9A600 uses LANVIEW, The Cabletron Systems built-in visual diagnostic and status monitoring system. With LANVIEW LEDs, you can quickly identify the device, port, and physical layer status at a glance.

Related Manuals

The manuals listed below should be used to supplement the procedures and technical data contained in this manual.

9A656-04 and 9A600 Configuration Guide

SmartSwitch 9000 Installation Guide

SmartSwitch 9000 Operations Guide

SmartSwitch 9000 9C300-1 Environmental Module User's Guide

SmartSwitch 9000 9C214-1 AC Power Supply User's Guide

SmartSwitch 9000 Local Management User's Guide

SmartSwitch 9000 6 9C106 Setup and Installation Guide

SmartSwitch 9000 6 Module Local Management User's Guide

Getting Help

For additional support related to this device or document, contact the Cabletron Systems Global Call Center:

Phone	(603) 332-9400
Internet mail	support@cabletron.com
FTP Login Password	ftp://ftp.cabletron.com/ *anonymous* *your email address*
For additional information about Cabletron Systems or its products, visit the World Wide Web site: **http://www.cabletron.com/**	
To send comments or suggestions concerning this document, contact the Cabletron Systems Technical Writing Department via the following email address: **TechWriting@cabletron.com** *Make sure to include the document Part Number in the email message.*	

Before calling the Cabletron Systems Global Call Center, have the following information ready:

- Your Cabletron Systems service contract number
- A description of the failure
- A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)
- The serial and revision numbers of all involved Cabletron Systems products in the network
- A description of your network environment (layout, cable type, etc.)
- Network load and frame size at the time of trouble (if known)
- The device history (i.e., have you returned the device before, is this a recurring problem, etc.)
- Any previous Return Material Authorization (RMA) numbers

Chapter 2

Installing the 9A600 Module

SmartSwitch 9500 modules can be installed in any of the slots that are available. To install a module, proceed as follows:

Observe all antistatic precautions when handling sensitive electronic equipment.

1. Remove the blank plate covering the slot in which the 9A600 will be installed. All other slots must remain covered to ensure proper airflow and cooling. (Save the blank plate in the event you need to remove the module.)
2. Unpack the 9A600 by carefully removing it from the shipping box. (Save the box and packing materials in the event the module must be reshipped.)
3. Remove the 9A600 from the plastic bag. (Save the bag in the event the module must be reshipped.) Observe all precautions to prevent damage from Electrostatic Discharge (ESD).
4. Examine the 9A600 for damage. If any damage exists, DO NOT install the module. Immediately contact the Cabletron Systems Global Call Center.

To prevent damaging the backplane connectors in the following step, take care that the module slides in straight and properly engages the backplane connectors.

5. Install the 9A600 module in the chassis by aligning the module card between the upper and lower metal slot guides of any available slot, sliding it into the chassis, and locking down the top and bottom plastic tabs, as shown in Figure 2-1. Take care that the 9A600 slides in straight and properly engages the backplane connectors.

The 9A600 may be removed from the chassis while it is operational, but a brief system downtime will result. When the interface module is removed, the remaining modules go through an initialization process to determine which interface module will become the module that performs specific management functions.

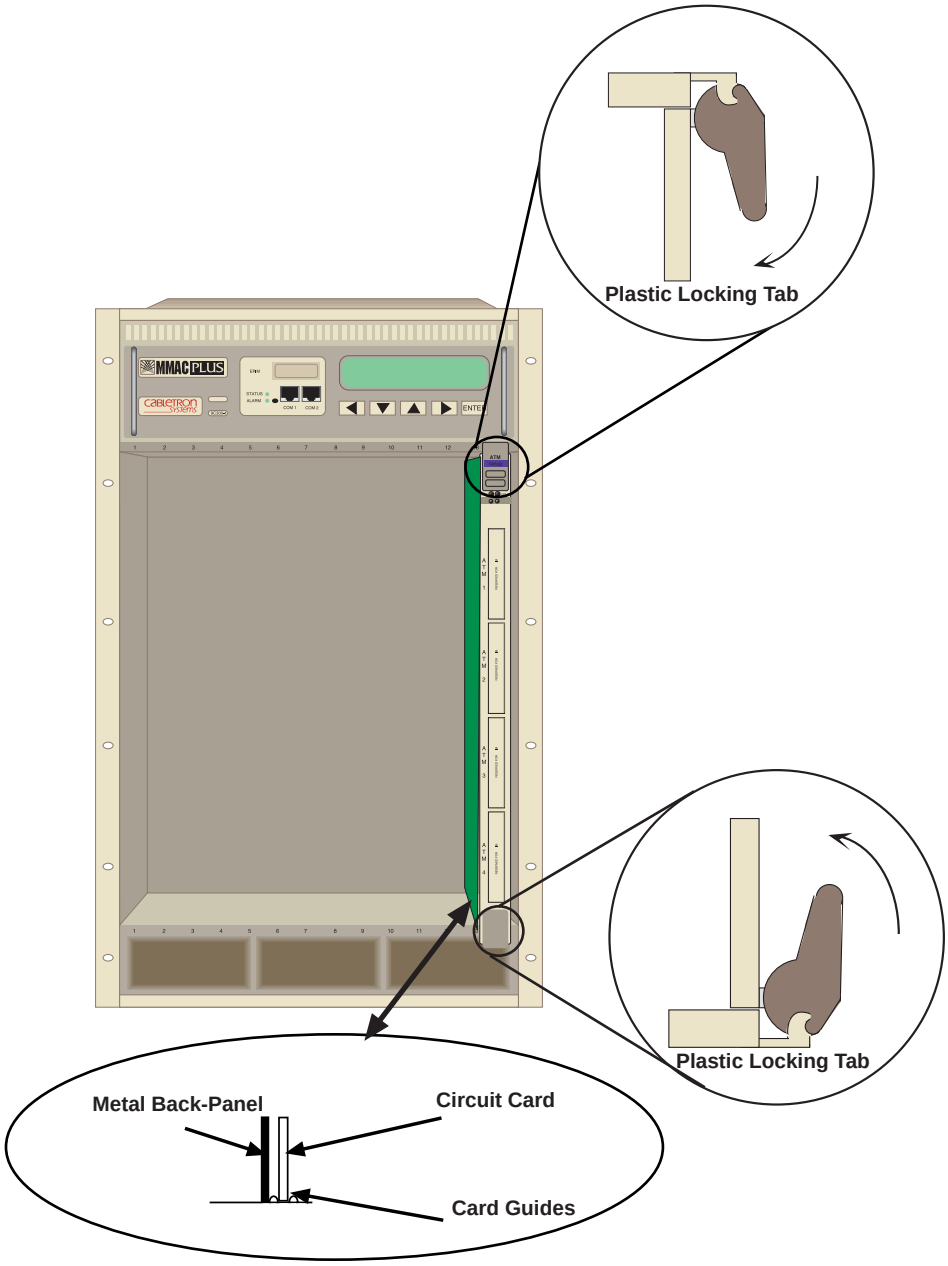


Figure 2-1. Installing the 9A600

The Reset Switch

Resetting the 9A600 will cause a brief period of system downtime. When the interface module is reset, the remaining modules go through an initialization process to determine which interface module will become the module that performs specific management functions.

The Reset switch is located on the front panel, under the top plastic tab as shown in Figure 2-2. It serves two functions:

- Pressing the Reset switch twice within three seconds causes the processor (i960) to reset.
- Pressing and holding the switch on for three or more seconds causes the module to shutdown. Pressing and holding the button again for three seconds restarts the module.

SNMP management may be used to disable this switch to enhance module security.

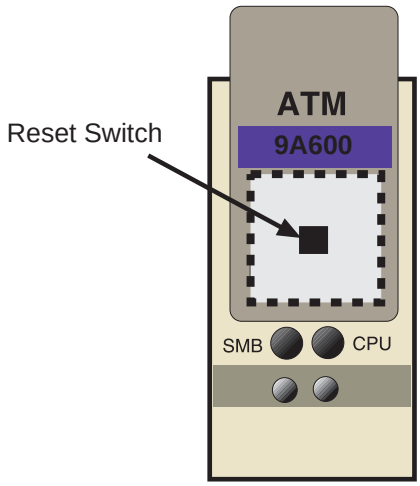


Figure 2-2. The Reset Switch

The Module Card DIP Switch

An eight position DIP switch is located on the module card as shown in Figure 2-3. The functions of the switches are listed in Table 2-1.

Do not toggle Switch 8 unless you intend to reset the user configured passwords to their factory default settings.

Do not toggle Switch 7 unless you intend to reset the user parameters to the factory default settings. Refer to the ***9A656-04 and 9A600 Configuration Guide*** *for instructions on the parameters that may be configured by the user via Local/Remote Management.*

Table 2-1. Function of the DIP Switch

Switch	Function	Description
8	Clear Password	When toggled, this switch clears user-entered passwords stored in NVRAM, and restores the default passwords. Once reset you can use the defaults or enter new passwords.
7	Clear NVRAM	The module uses NVRAM to store user entered parameters such as IP addresses, device name, etc. To reset these parameters to the factory defaults, toggle this switch. Once reset you can use the defaults or enter new parameters which are stored in NVRAM when the module is powered down, and remain there until the switch is toggled again.
6	Force BootP Download	Toggling this switch after pulling the board out of the SmartSwitch 9500, clears download information from NVRAM and forces image files to be downloaded from the station connected to the EPIM on the Environmental Module configured to act as that modules' BOOTP server.
5	Reserved	For Factory Use Only
4	Reserved	For Factory Use Only
3	Reserved	For Factory Use Only
2	Reserved	For Factory Use Only
1	Reserved	For Factory Use Only

Installing an ANIM

Figure 2-3 shows the location of the 4 motherboard connectors, and the 16 standoff screws for the ATM Network Interface Modules (ANIMs). Figure 2-3 also shows the location of the Module Card DIP Switch.

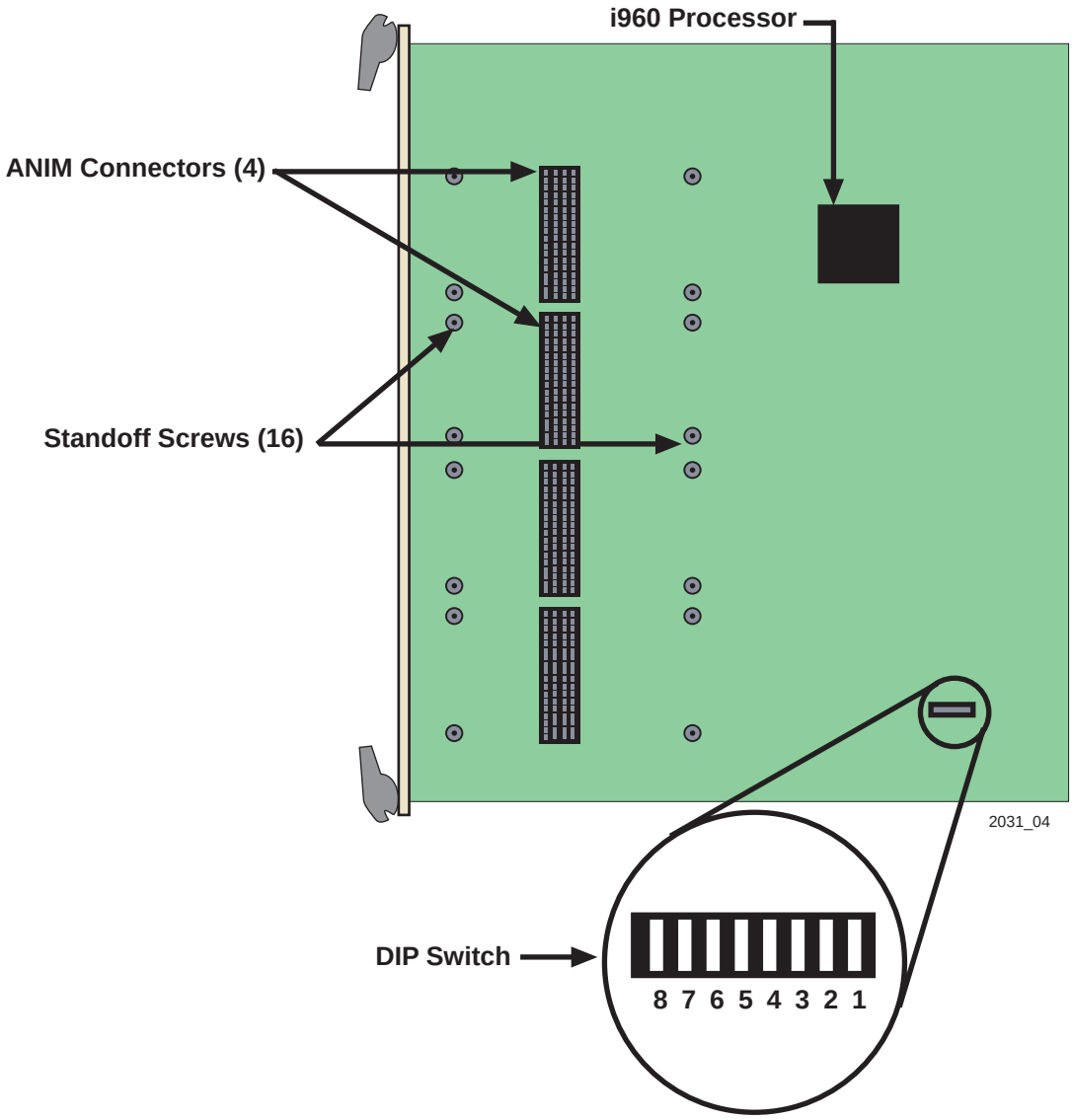


Figure 2-3. ANIM Connector Locations and Module DIP Switch Location

The ANIM and 9A600 module are sensitive to static discharges. Use a grounding strap and observe all static precautions during this procedure. Failure to do so could damage the ANIM and the 9A600 module.

If you are installing ANIMs in more than one slot, remove the cover plates from all the associated slot openings.

A Phillips Head screwdriver is needed to install the ANIMs.

The 9A600 module is shipped without ANIMs. To install the ANIMs proceed as follows:

1. Remove the module if it is installed in the SmartSwitch 9500 chassis. To remove a module, release (rotate outward) the top and bottom plastic locking tabs, then slide the module out of the chassis.
2. Refer to Figure 2-4. Remove the two screws fastening the coverplate to the front standoffs where the ANIM is to be installed. Save the screws.
3. Lift and remove the coverplate from the top of the front standoffs.

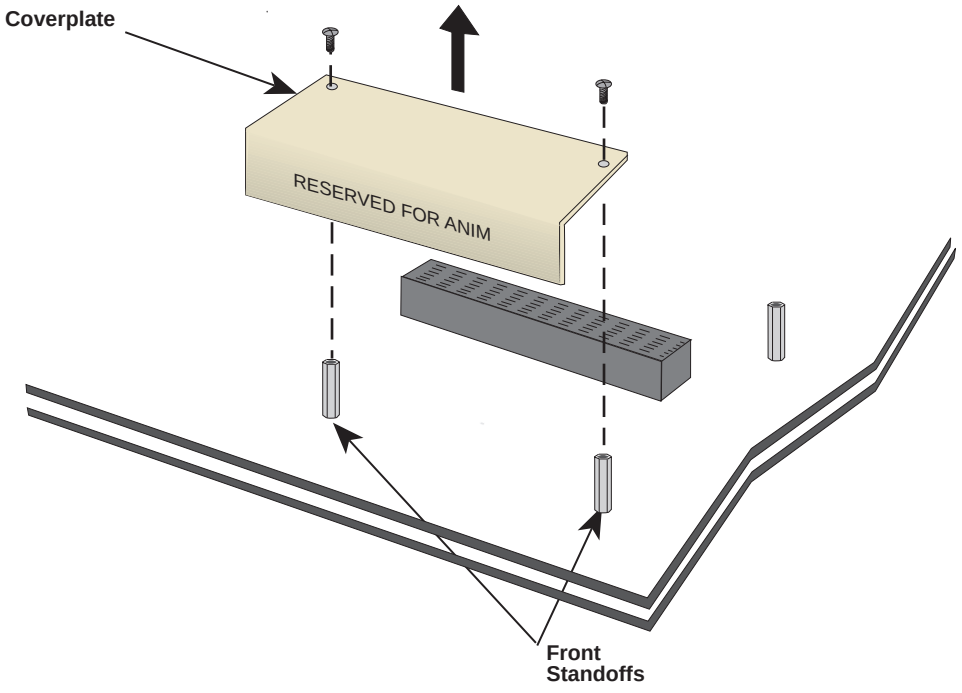


Figure 2-4. Removing the Coverplate

4. Refer to Figure 2-5. Hold the ANIM by the provided cutouts on the board of the ANIM.

When installing or removing an ANIM make sure to always use the cut outs on the board to handle the ANIM. See Figure 2-6 for the location of the cutouts.

When connecting the ANIM pins to the motherboard connector take extra precaution that the pins do not enter the connector at an angle as this will damage both the ANIM and the motherboard connector.

5. Press straight down firmly on the ANIM until the pins slide all the way into the motherboard connector. Ensure that the ANIM seats flush on the standoffs.
6. Secure the ANIM with the two screws saved in step 2 and the two screws supplied with each ANIM.
7. If there is more than one ANIM to install, repeat steps 2 through 6 to install each one.

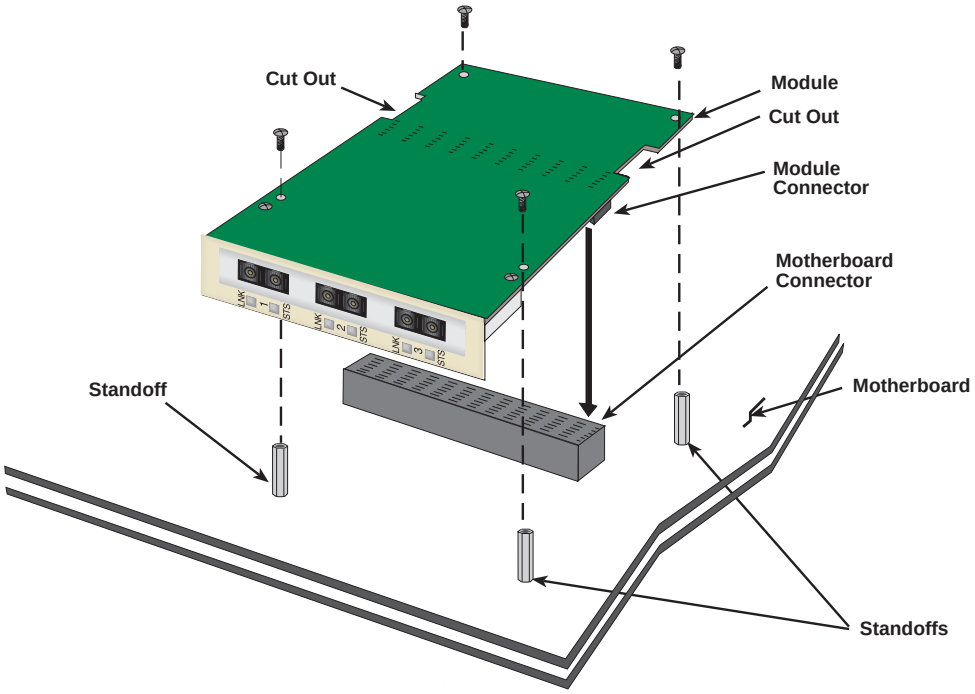


Figure 2-5. Installing an ANIM

Chapter 3

Operation

The 9A600 provides switching between the front panel interfaces (ANIMs). Figure 3-1 shows the traffic flow of ATM cells in the 9A600. The following sections briefly describe the functions of the i960 Processor, the ASICs, and how they relate to ATM cell traffic flow.

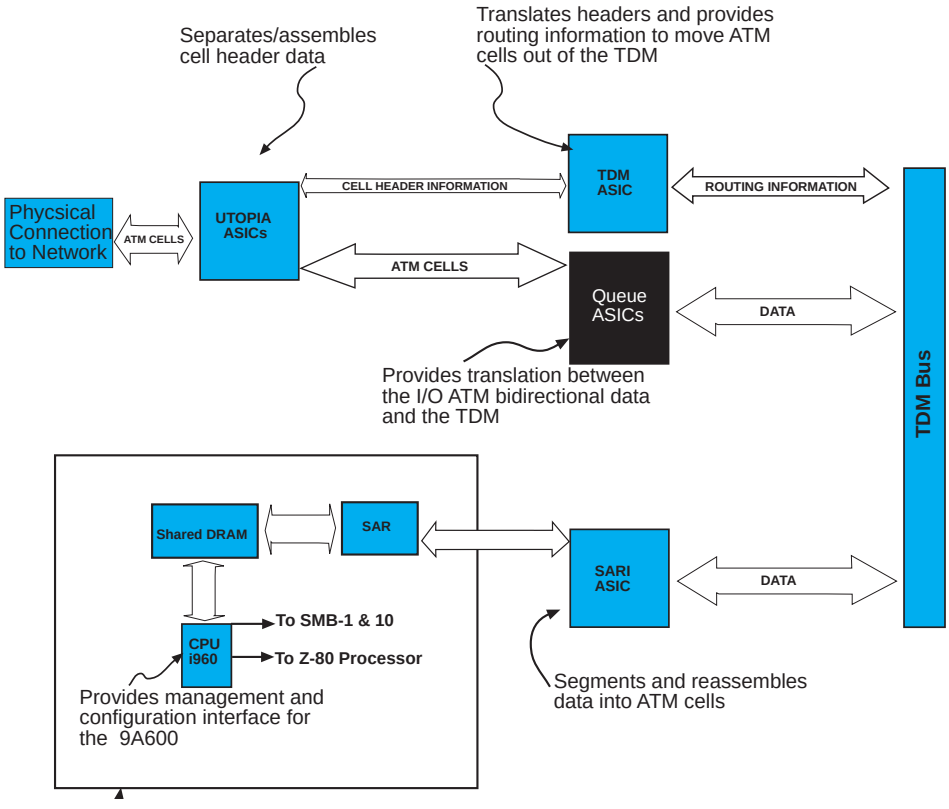


Figure 3-1. 9A600 Block Diagram

ATM Cell Traffic Flow in the 9A600

The 9A600 SmartSwitch utilizes several innovative features that result in a completely redundant, fault-tolerant design. The most important hardware facets of the 9A600 features are the Cabletron Systems ASICs, and the i960 HD RISC Processor.

Cabletron Systems ASICs

The 9A600 SmartSwitch utilizes four separate Cabletron Systems designed ASICs to perform switching functions. Refer to Figure 3-1 to see how these four ASICs work together to provide proper traffic flow. The definitions for these ASICs are as follows:

Queue ASIC

The 9A600 has four Queue ASICs installed on the motherboard. These ASICs support 16 priority queues each. The Queue ASICs support all classes of ATM service including Constant Bit Rate (CBR), Variable Bit Rate (VBR), Available Bit Rate (ABR) and Unspecified Bit Rate (UBR). The Queue ASICs also manage all cell transfers to the Utopia ASICs, using a weighted round-robin algorithm.

TDM (Time Division Multiplexer) ASIC

The TDM ASIC is the central switching engine of the 9A600. The TDM ASIC maintains the connection table, gathers statistics, and provides Usage Parameter Control (UPC) policing. The TDM ASIC supports up to 128k virtual connections.

SARI (Segmentation and Reassembly Interface) ASIC

The SARI ASIC is the interface that controls the data flow between the TDM Bus and the i960 Host Processor. The SARI ASIC has a 768-cell queue and provides the traffic management features of the 9A600.

Utopia (Universal Test and Operation Physical Interface) ASICs

The 9A600 has four Utopia ASICs whose role is to process ATM cells from the ANIMs to the TDM Bus, and vice versa. In addition, the Utopia ASICs are responsible for performing path lookups and outbound header translation.

i960HD Processor

The i960HD processor, working with the four types of ASICs defined earlier, is responsible for distributed management functions, signalling, SNMP management and serving as the in-band management LAN Emulation Client (LEC) for the module. The i960 also supports out-of-band management interfaces.

System Management Buses

There are two management channels within the SmartSwitch 9500 system:

- SMB-1
- SMB-10

These buses provide out-of-band management and inter-module management communication.

SMB-1 Bus

The SMB-1 is a 1 Mbps management bus located within the SmartSwitch 9500 chassis. This bus is used by all diagnostic controllers in the system, including the following:

- Connectivity modules
- Power supply modules
- The environmental module

The SMB-1 transports inter-chassis information between system components, such as power and environmental information, as well as diagnostic messages. Periodic loop-back tests are performed by all modules that share this bus to ensure the validity of SMB-1. In the event a failure is detected on SMB-1, the SMB-10 may be used as an alternate communication channel.

SMB-10 Bus

The SMB-10 is a 10 Mbps management bus located within the SmartSwitch 9500 chassis, which is also used for inter-chassis communication of modules, as well as serving as an out-of-band management channel into the SmartSwitch 9500. The SMB-10 is externalized from the chassis via an optional Ethernet Port Interface Module (EPIM) located on the front of the environmental module. Through an EPIM connection, full SNMP management of the SmartSwitch 9500 is available out-of-band from user data. Modules that share the SMB-10 bus periodically send out loopback packets to ensure the validity of the SMB-10. In the event a fault is detected on the SMB-10, the SMB-1 can be used as an alternate communication channel by the modules.

System Diagnostic Controller

This diagnostic controller is composed of a Z-80 microprocessor and its supporting logic. The diagnostic controller performs the following:

- Controls the power-up sequencing of modules
- Monitors the 9A600 input and output power parameters
- Keeps watch over the main host processor
- Monitors the temperature
- Controls the SMB LANVIEW diagnostic LED

Although the diagnostic controller and the main host processor can operate independently of each other if needed, they exchange information about each other's status and overall module condition. The information gathered by the diagnostic controller is available to the network manager via Local/Remote Management and the LCD located on the environmental module. The 9A600 has been designed so that in the event of a diagnostic controller fault, the modules continue to function.

DC/DC Converter

The DC/DC converter converts the 48 Vdc on the system power bus to the necessary operating voltages for its host network services module. The diagnostic controller controls the operation of the dc/dc converter.

Chapter 4

LANVIEW LEDs

The front panel LANVIEW LEDs indicate the status of the module and may be used as an aid in troubleshooting. Shown in Figure 4-1 are the LANVIEW LEDs of the 9A600 module. Refer to Table 4-1 for the full definitions of 9A600 LED states.

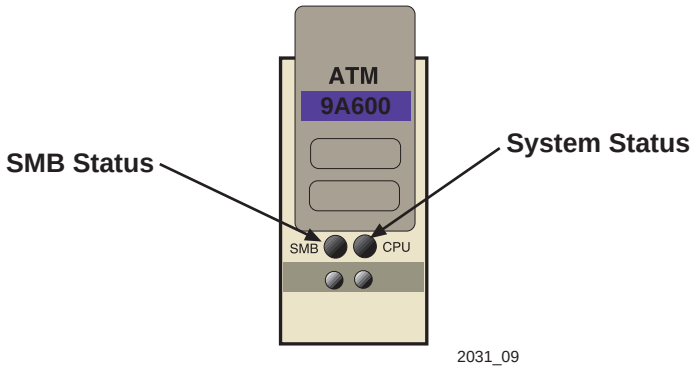


Figure 4-1. 9A600 LANVIEW LEDs

Table 4-1. SMB and CPU LEDs

LED	LED Color	State	Definition
SMB	Green	Functional	Fully operational
	Amber	Fault	No database synchronization with the Environmental Module or SMB.
	Off	Power off	Module powered off
CPU	Amber/Green	Booting	LED blinks amber and green while booting
	Red (Flashing)	Failed	Fatal error has occurred
	Off	Power off	Module powered off

ANIM LEDs

The front panel LANVIEW LEDs indicate the status of the ANIM and may be used as an aid in troubleshooting. Shown in Figure 4-2 are the LANVIEW LEDs of all ANIMs. Although there are several types of ANIMs, all share the same LANVIEW LEDs. Refer to Table 4-2 for the full definitions of ANIM LED states.

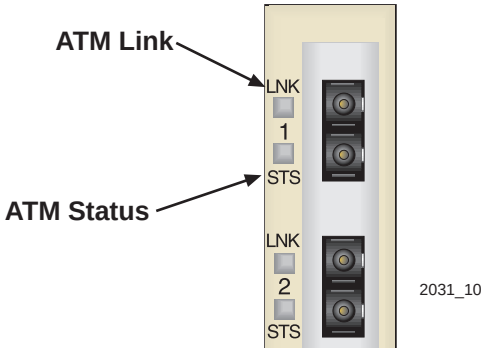


Figure 4-2. ANIM LEDs

Table 4-2. ANIM LEDs

LED	LED Color	Status
LNK	Green	Link
	Off	No Link
STS	Green	Port Enabled and OK
	Amber	Standby
	Red	Port Enabled and Error

Chapter 5

General Specifications

The specifications for the 9A600 are detailed in the sections that follow.

Operating Specifications

Environmental Requirements

Operating Temperature:	5°C to 40°C (41°F to 104°F)
Storage Temperature:	-30°C to 73°C (-22°F to 164°F)
Operating Relative Humidity:	5% to 90% (non-condensing)

Regulatory Compliance

Safety

This equipment meets the safety requirements of UL 1950, CSA C22.2 No. 950, EN 60950, IEC 950 and 73/23/EEC.

Electromagnetic Compatibility

This equipment meets the requirements of FCC Part 15, EN 55022, VCCI V-3, CSA C108.8, EN 50082-1, AS/NZS 3548 and 89/336/EEC.

Service

MTBF MHBK+217E	>200,000 hrs.
MTTR	<0.5 hr.

Physical

Dimensions
35.0 D x 44.0 H x 3.0 W centimeters
(13.8 D x 17.4 H x 1.2 W inches)

Weight
Unit: 1.36 kg. (3lb)
Shipping: 1.81 kg. (4lb)

Device Specifications

Processor
Intel i960HD RISC processor control

Dynamic Random Access Memory (DRAM)
64 MB

FLASH Memory
8 MB

ANIM Specifications

The 9A600 uses ATM Network Interface Modules (ANIMs) to provide front panel cable connections. The ANIMs should be installed by qualified personnel. Refer to the section in Chapter 2 entitled **Installing an ANIM** for full instructions on the installation process.

ANIM-21/3

The ANIM-21/3 provides a multimode fiber connection using a Duplex SC connector and a line rate of 155.52 Mbps. The specifications for the ANIM-21/3 are listed in Table 5-1.

Table 5-1 .ANIM-21/3 Specifications

Parameter	Specification
Number of Interfaces	3
Line Rate	155.52 Mbps
Interface Type	Duplex SC
Media Type	Multimode Fiber
Frame Type	SONET/SDH
Typical Range	2 km
Loss Budget	TX -17 db to -12 db
	RX -27 db to -12 db

2031_11

Figure 5-1. ANIM-21/3

ANIM-29/3

The ANIM-29/3 provides a single mode fiber connection using a Duplex SC connector with a line rate of 155.52 Mbps. The specifications for the ANIM-29/3 are listed in Table 5-2.

Table 5-2 .ANIM-29/3 Specifications

Parameter	Specification
Number of Interfaces	3
Line Rate	155.52 Mbps
Interface Type	Duplex SC
Media Type	Single mode Fiber
Frame Type	SONET/SDH
Typical Range	15 km
Loss Budget	TX -15 db to -8 db
	RX -31 db to -8 db

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Figure 5-2. ANIM-29/3

ANIM-29/3LR

The ANIM-29/3LR provides a single mode fiber connection using a Duplex SC connector with a line rate of 155.52 Mbps. The specifications for the ANIM-29/3LR are listed in Table 5-3.

Table 5-3 .ANIM-29/3LR Specifications

Parameter	Specification
Number of Interfaces	3
Line Rate	155.52 Mbps
Interface Type	Duplex SC
Media Type	Single mode Fiber
Frame Type	SONET/SDH
Typical Range	60 km
Loss Budget	TX -15 db to -8 db
	RX -31 db to -8 db

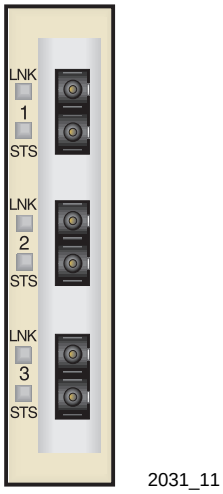

Figure 5-3. ANIM-29/3LR

ANIM-31/2

The ANIM-31/2 provides a multimode fiber connection using a Duplex SC connector with a line rate of 622 Mbps. The specifications for the ANIM-31/2 are listed in Table 5-4.

Table 5-4 .ANIM-31/2 Specifications

Parameter	Specification
Number of Interfaces	2
Line Rate	622 Mbps
Interface Type	Duplex SC
Media Type	Multimode Fiber
Frame Type	SONET/SDH
Typical Range	2km
Loss Budget	TX -19 db to -14 db
	RX -26 db to -14 db

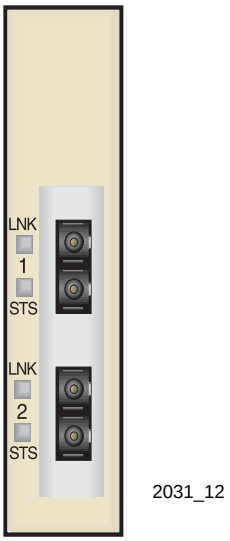

Figure 5-4. ANIM 31/2

ANIM-39/2

The ANIM-39/2 provides a single mode fiber connection using a Duplex SC connector with a line rate of 622 Mbps. The specifications for the ANIM-39/2 are listed in Table 5-5.

Table 5-5 .ANIM-39/2 Specifications

Parameter	Specification
Number of Interfaces	2
Line Rate	622 Mbps
Interface Type	Duplex SC
Media Type	Single mode Fiber
Frame Type	SONET/SDH
Typical Range	15 km
Loss Budget	TX -15 db to -8 db
	RX -28 db to -7 db

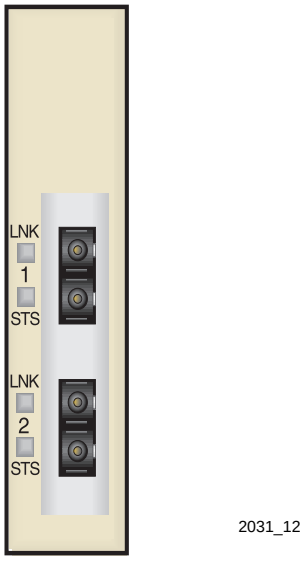

Figure 5-5. ANIM 39/2

ANIM-39/2LR

The ANIM-39/2LR provides a single mode fiber connection using a Duplex SC connector with a line rate of 622 Mbps. The specifications for the ANIM-39/2LR are listed in Table 5-5.

Table 5-6 .ANIM-39/2LR Specifications

Parameter	Specification
Number of Interfaces	2
Line Rate	622 Mbps
Interface Type	Duplex SC
Media Type	Single mode Fiber
Frame Type	SONET/SDH
Typical Range	60 km
Loss Budget	TX -15 db to -8 db
	RX -28 db to -7 db

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Figure 5-6. ANIM 39/2LR

ANIM-67/2

The ANIM-67/2 provides a coaxial cable connection using BNC connectors with a line rate of 45 Mbps. The specifications for the ANIM-67/2 are listed in Table 5-7.

Table 5-7 .ANIM-67/2 Specifications

Parameter	Specification
Number of Interfaces	2
Line Rate	45 Mbps
Interface Type	BNC
Media Type	Coaxial Cable
Frame Type	DS3
Typical Range	185 meters

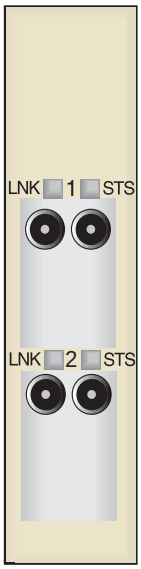

Figure 5-7. ANIM-67/2

ANIM-77/2

The ANIM-77/2 provides a coaxial cable connection using BNC connectors with a line rate of 34 Mbps. The specifications for the ANIM-77/2 are listed in Table 5-8.

Table 5-8 .ANIM-77/2 Specifications

Parameter	Specification
Number of Interfaces	2
Line Rate	34 Mbps
Interface Type	BNC
Media Type	Coaxial Cable
Frame Type	E3
Typical Range	185 meters

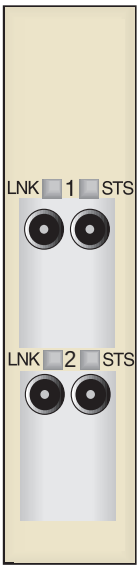

Figure 5-8. ANIM-77/2

ANIM-22/4

The ANIM-22/3 provides a Category 5 UTP connection using four RJ45 connectors with a line rate of 155.52 Mbps. The specifications for the ANIM-22/4 are listed in Table 5-9.

Table 5-9 .ANIM-22/4 Specifications

Parameter	Specification
Number of Interfaces	4
Line Rate	155.52 Mbps
Interface Type	RJ45
Media Type	Category 5 UTP
Frame Type	SONET/SDH
Typical Range	100 meters

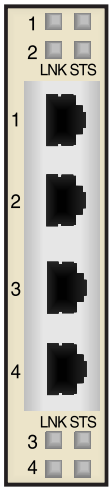

Figure 5-9. ANIM 22/4